Time & location:
Thursday, October 20, 2016, 13:00 – 18:00, Friday, October 21, 2016, 08:30 – 12:00
BEV central office, Schiffamtsgasse 1-3, 1020 Vienna
Room: A802 (8th floor)

MINUTES
Last update: October 25, 2016

1. Opening
   On behalf of the president of BEV, Wernher Hoffmann, Gerd Steinkellner welcomes the participants and gives a short overview about BEV and its divisions. Erich Imrek adds some organisational information. AK welcomes the participants and thanks BEV on behalf for the TWG for the invitation.

2. Approval of minutes of 71th TWG meeting in San Sebastian (all)
   The minutes of the last TWG meeting in San Sebastian were finally approved with one small change.

3. Review of Action Items from previous TWG meetings (Söhne)
   WS displays the action items of the last meeting which were either done or put on the agenda of this meeting.

4. EPN

   a. EPN CB report (Bruyninx)
      CB gives a presentation about the latest changes in the EPN Central Bureau. These changes cover the long station names, site logs in GeodesyML format, RINEX 2 (Rx2) and RINEX 3 (Rx3) issues, and extension of real-time monitoring to RTCM 3.2 format. She presents the new design of the EPN CB web pages which are now also prepared for tablet and smartphone use. There are more interactive tools for time series. Alarms are under development for observations, Rx2 and Rx3, multipath etc. Switching to the new pages is expected in November this year, a testing period is not possible due to technical restrictions. The TWG expresses its thanks for the big effort.

   b. Analysis Centre Coordinator (Liwosz)
      TL presents the results of an extensive test for the weekly combination from weekly solutions versus weekly combination from daily solutions which covered the GPS weeks 1831 to 1900. He shows differences 'weekly from weekly' minus 'weekly from daily' for 280 stations. More than 90 % of the stations show differences less than 0.1 mm in horizontal and 90 % of the stations show less than 0.25 mm difference in the vertical component. Discussion about outlier detection and cleaning: at which level should it be done? By the ACs for their individual solution or by the ACC within the combination? TWG proposes to do the outlier removal by ACC, it ensures the homogeneous handling of outliers. New scheme allows for a better detection and less removal of data (e.g., not the complete week for an affected station). Combined daily solutions are already published. Discussion about weekly solutions from the ACs: are they still necessary? RD explains the motivation of IGS for outlier removal which is due to applying atmospheric loading. AC reminds to the ACC bulletin where information about outliers are reported but only after the combination. Discussion about the troposphere solutions and combination which relies on the weekly solutions of the ACs.

   c. Short note on usage of individual vs. type mean antenna calibration

(Araszkiewicz)
AA recalls the short paper he sent around a few weeks ago about his investigations on the use of individual versus type mean antenna calibrations. In addition, he shows examples (e.g. stations BADH and BUTE) for shifts inferred by antenna change, which are different in size when applying individual to individual antenna calibration versus type mean to type mean antenna calibration (33 cases). As a general conclusion from his investigations he stated that the size of the shift is bigger, if individual calibrations are used. This is especially visible in height, while for horizontal components differences are distributed normally.

d. On the handling of different individual antenna calibrations (Dach)
RD informs about an update of the BSW program ATX2PCV. He reports on four IGS antennas for which both types of individual calibrations were available, chamber and robot. Advantage of chamber calibrations could be the availability of more frequencies. Mixing a set of parameters from both sources is the worst solution and should not be allowed. One problem the TWG identified is the lack of (good) calibration values today for additional constellations like GAL and BDS, for modern antennas which are already installed (and processed). Discussion about pros and cons of robot calibration and chamber calibration. Calibration periods of the calibration instrumentation itself seem to be different (for robot calibration every few weeks). CV notes that Geo++ will shortly change the procedure to add new constellations.

e. OLG Data Centre migration (Mitterschiffthaler)
With the retirement of GS next year, some changes of the Austrian contribution to EUREF are expected. PM presents details about the migration of OLG to BEV. OLG DC will move from Graz to Vienna. The migration covers both, the OLG DC as well as the OLG AC. Moreover, the change affects the TWG in person of the Data Flow Coordinator who is also responsible for the Campaigns. He explains the flexible storage concept of the DC with three levels. Both changes are planned to start in January 2017, with 3 months (AC) and 6 months (DC) parallel operation of old and new installations. Discussion about the differences between both EPN DCs: GS mentions two problems he observed: a) no upload of station data to both DCs (in those cases only to BKG) and b) no daily files merged from hourly files at BKG, due to different internal requirements. Station providers should again be urged to upload to both DCs. Discussion about upload mechanism of station data during the overlapping period at OLG: Should station providers upload in parallel or switch at one specific date? OLG plans to contact each station provider separately to inform about the changes.
The TWG accepts the concept of migration and also the proposed change of the names from OLG to BEV.

f. Short note on Action Item 3 of TWG71 on possible reformulation of EPN station guidelines (Söhne)
WS recalls the various EPN guidelines concerning the formulations about the procedure of reporting on and use of individual antenna calibration values within the EPN. Three guidelines are mentioned ("Guidelines for Becoming an EPN Station", "Guidelines for EPN Stations and Operational Centres" and "Guidelines for EPN Analysis Centres"). He concludes that the guidelines are clear and unambiguous for proposed or new EPN stations and don't need a reformulation.

5. Reprocessing WG: Conclusions from Repro2 and product delivery (Voelksen)
CV recalls the history and products of EPN Repro2. Five ACs have been contributing with various products. AK adds the status of the cumulative solution and he recalls the problems (jumps) in 2014 when continuing the routine analysis. All SNX files are completely computed

with IGb08. When will the Repro2 results be introduced in the cumulative solutions? TWG accepts the Repro2 results as official product. RP adds some slides about the troposphere combination of Repro2 results. Should a DOI for the EPN-Repro2 dataset be ordered? TWG is in favor. Site redundancy has been identified as a weak problem in Repro2 and is also a question for routine operation. It was agreed to repeat the recommendation of the last TWG meeting for cleaning of data base etc.

6. Multi-GNSS WG (Brockmann et al.)
    Discussing again the long filenames of Rx3 files, EB points to the meteo files which seem to be neglected in the overall discussion. They are included in the latest version of Rx 3.03 description. Necessity of Rx3 to Rx2 conversion and vice versa is also discussed within IGS (Montenbruck, GFZ). A new Anubis version is announced by JD. Some monitoring example are presented, e.g. for Rx3 of station TLSE (GLONASS and BDS), REYK with a limit to four Galileo satellites per epoch. EB informs about an extended campaign covering 200 station done in summer in Switzerland, processed on a multi-GNSS basis. AC LPT switched to BSW5.3 in GPSweek 1905, with processing GAL and BDS, using CODE MGEX final products which are coming quite regularly. Estimating intersystem translation parameters (three for coordinates plus 1 for troposphere). Approx. 13 % more observations compared to GPS+GLO only. Discussion about what metadata etc. is missing to start GAL with BSW5.2 for the other ACs. RD proposes to release a document for proper handling, probably in January. CV asks which receiver could already provide Rx3 long filename from its firmware. Seems to be Septentrio PolarX5 the only one.
    WS raises the question of Rx3 to Rx2 conversion. Tools like 'gfzrnx' are available for this. Discussion about using it for routine operation in the EPN. Guidelines say that Rx2 files have to come directly from the station. Discussion about the means for reducing the transition period from Rx2 to Rx3.

7. Alignment of EPN cumulative solutions to IGb08 (Caporali)
    AC gives a presentation about his investigation about EPN cumulative solutions and alignment to IGb08, as an update of the presentation at the last symposium on this topic. Again discussion about the 4 transformation parameters: What is coming out from BSW5.2 and what is the meaning of the transition parameters. RD points out that the translation parameters in the local frame depend on the network geometry, whereas the geocentric parameters don't. AC shows that the common IGS/EPN class A sites used for the analysis of the frame alignment have been the same consistently across the time span of the analysis. It follows that the geocentric parameters and the parameters in the local frame are related by a coordinate transformation with identical parameters across the entire data set. Hence the results obtained in the geocentric frame and in the local frame are equivalent. The subject should be analysed in more detail.

8. Terms of Reference (All)
    WS opens the discussion by presenting the survey he distributed internally some weeks ago. Only four members returned the questionnaire before the meeting. Discussion on, e.g., legal status, adding gravity, consortium agreement (CA), etc. AK continues by proposing to discuss specific points or entities. One advantage of a CA would be that institutions can refer to it. RD highlights the differences between a MoU and CA concerning, for example, level of binding. CB is asked to write a draft version for a CA, but she replies that we first need the rule, e.g. on voting, in the ToR before start to write a CA. ZA and RF point to the IAG rules EUREF has to rely on. It is agreed to separate the discussion into blocks and build up the document gradually following agreement on the main discussion points. The first critical point is the EUREF membership and discussion should be started with collecting ideas and proposals for the membership.

9. UN-GGIM
    a. Brief Summary of UN-GGIM 6th session (Altamimi)

ZA reports on the outcome of the last UN-GGIM meeting in August, especially the committee of experts. The roadmap should be implemented soon. A work plan for the next two years has to be set up. The regional contributions should be strengthened. AK asks for the members of the expert group. ZA replies that national heads are the members. It is planned to establish a sub-committee on geodesy.

b. UN-GGIM: Europe (Poutanen)
MP continues with a presentation about UN-GGIM: Europe which held its third plenary meeting on October, 5, in Budapest and a potential GRF working group[1]. ML asks for the chair of UN-GGIM: Europe WG on Geodesy. Not decided yet. ZA asks about the seat of observing status. TWG is in favour of this.

10. EUREF 2017 symposium (Kaplon)
JK gives an overview about the status of the preparation for the 2017 symposium. Different locations are preferred or are available for the different possible dates. TWG meeting and tutorial to take place at the university. Finally, May, 15-19, 2017 is confirmed as the date. Announcement by EUREF mail will be done end of October. The web site is planned to be online Dec, 1, 2016. Discussion about the tutorial: WS proposes to have a tutorial about real-time GNSS. TWG is in doubt if it is possible to fill a full day tutorial and if there is enough interest for the topic. As a compromise it is agreed to set-up a plan for a half-day tutorial (e.g. Tuesday afternoon).

11. EPOS (Bruyninx et al.)
CB presents the GNSS data flow foreseen within EPOS. Consists mainly of data gateways and data repositories. ROB and BKG planned to act as data repositories from EUREF side. One issue is the installation of a special software 'GLASS' at the repositories. Main issue is the level of commitment between the EPN data centres and the station providers which is higher for EPOS than for the EPN. Both data centres have to get in touch with the station providers for this. Discussion about the best suitable way to do this: official document to be signed, confirmation by email sufficient, or implicit confirmation by no objection?

12. ITRF2014 – ETRS89

a. ITRF2014 Plate Motion Model – Discussion on ETRS89 realization (Altamimi)
ZA discusses a new plate motion model (PMM) derived from ITRF2014. Six criteria were applied to select GNSS stations on the stable parts of the plates and ended up with 318 usable stations. Large differences in the results while rejecting different sets of stations (316 (w/o ARTU and KERG) -297 remaining for the final model). A paper about this topic is in preparation. Two different inversion models are discussed. More stations, e.g. in South-America, are available with the new ITRF. He explains the derivation of an updated Eurasia rotation pole. Uncertainties are decreasing significantly. By definition, no scale and no translation and scale rates when transforming from any ITRFyy to corresponding ETRFyy, e.g. from ITRF2014 to ETRF2014, and also from ITRF2000 to ETRF2000. ML askes for the interpretation of the rate when inverting for plate motion model and ZA replies there is no physical meaning of that rate, mutually a network effect. ZA is referring to a presentation by EB from 2016 (EUREF tutorial in San Sebastian) containing a list of most recent ETRS89 realizations and he emphasises the countries which are still using older than ETRF2000 reference frames and reference epochs, although using ETRF2000 is a recommendation of the TWG. ZA

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1 See http://un-ggim-europe.org/content/un-ggim-europe-announces-creation-grf-europe for the announcement and http://un-ggim-europe.org/sites/default/files/12_GRF %20Europe1016.pdf for the presentation of MP (as of Oct, 25, 2016)

is offering the three options on the introduction of the new ETRS89 realization he already presented at the EUREF symposium. ML stresses the impact of ETRF2014 for the ellipsoidal heights. ZA argues that adopting a geocentric ETRF2014, whose origin coincides with that of the ITRF2014, would ensure consistency between geometric positioning and gravity measurements that are assumed to be referred to the Earth Center of Mass. He emphazises that the TWG should offer the best and the most accurate ETRFyy frame and it is up to the countries to follow or not the TWG non-binding recommendation. The TWG is aware of the scientific and practical advantages and disadvantages of the three options. The (non-binding) recommendation to the countries will be formulated after analysing the feedback coming from the questionnaire.

b. ETRS89 Questionnaire (All)
The TWG was asked to set up and distribute a questionnaire to the EUREF community asking for the opinion on an updated ETRS89 realization based on the ITRF2014. The note prepared by ZA and distributed before the meeting can act as a basis for the fact sheet.

13. AOB

a. MERGE (Lidberg)
ML gives a review on the H2020 proposal to the INFRAIA call written by a group of ten partners, including several TWG members, and uploaded end of March, which reached a score of 7.0 of 10. Discussion about lessons learned from the evaluation. WS points to the next H2020 call related to Galileo (H2020-GALILEO-GSA-2017-1, https://www.gsa.europa.eu/r-d/h2020/introduction and other links) to be opened Nov, 8, 2016.

b. Co-seismic displacements following the Aug, 24, 2016 earthquake near Rome (Caporali)
AC presents observations and results derived from the Aug, 24, 2016 earthquake near Rome. 22 GNSS sites were available within a range of 100 km from the epicentre.

c. ICG-11 meeting in Sotchi, Russia, Nov 6-11, 2016 (Poutanen)
MP informs about his participation to the next ICG meeting in Sotchi, Russia, Nov, 6-11, where he intends to give a short presentation about EUREF. He invites everyone to provide him with details about the latest developments and results.

d. Eurisy (Söhne)
WS shortly informs about Eurisy (www.eurisy.org) which is a "non-profit association connecting space and society" and defines itself as a facilitator. Several organisations, e.g. ASI (Italy), CNES (France), DLR (Germany) and ESA are Eurisy members. There is a workshop scheduled on Oct, 27, in Berchtesgaden about "Satellite Applications for the Alps".

e. EUREF presentation at BGR workshop in Hanover, Germany, Nov, 2-3, 2016 (Söhne)
WS is invited on behalf of EUREF to give a talk about EUREF activities with focus on positioning on the workshop called "Supra-National Ground Motion Service".

14. Next TWG meeting (all)
The next TWG meeting is planned for mid of February in Matera. With regard to travelling, a full day meeting is proposed.

15. Action Items (Söhne, Kenyeres)

Action Item 1 on Agenda Item 4b for WS and TL: add the combined daily solutions to the list

of official products and send the result to the EUREF web manager.

Action Item 2 on Agenda Item 4b for TL: write a EUREF and LAC mail about the new strategy including proposing a date for the change.

Action Item 3 on Agenda Item 4c for AA: continue with the investigations about the use of different antenna calibrations, especially concerning the jumps introduced by antenna changes.

Action Item 4 on Agenda Item 4e for GS and PM: provide a plan for a smooth transition from OLG AC and DC to BEV AC and DC. Write a EUREF and a LAC mail about the change which is starting Jan, 1, 2017.

Action Item 5 on Agenda Item 5 for AA, AK, CB, JD, TL, and RP: Agree and perform the cleaning of all databases based on the results of Repro2.

Action Item 6 on Agenda Item 5 for AK: Repro 2 product is introduced in the cumulative solution at the next release C1905.

Action Item 7 on Agenda Item 6 to WS: write to Nacho Romero about the introduction of long filenames for Rx3 meteo files.

Action Item 8 on Agenda Item 6 for WS and EB: Provide details for a conversion table of Rx3 signals to Rx2.

Action Item 9 on Agenda Item 7 for AC, RD, and EB: Examine in more detail the analysis on the IGb08/Cxxxx alignment and report at the next TWG.

Action Item 10 on Agenda Item 8 for ZA, MP, AK, and WS: formulate a proposal for the EUREF membership as part of the EUREF Terms of References.

Action Item 11 on Agenda Item 10 for the session chairs of the 2016 symposium: check and change, if necessary, the existing description for the sessions. Identify possible keynote speakers well in advance to the symposium.

Action Item 12 on Agenda Item 10 for WS: formulate the program for a potential real-time GNSS tutorial, until end of November.

Action Item 13 on Agenda Item 10 for JK: write a EUREF mail informing about the date of the symposium ('save the date') by end of October.

Action Item 14 on Agenda Item 11 for CB and WS: formulate a MoU as a (approx. one page) letter to the station providers with the confirmation that the GNSS data uploaded to BKG and ROB can also be used for EPOS.

Action Item 15 on Agenda Item 12b for AK, MP, WS, and ZA: formulate and prepare the document for the ETRS89 questionnaire, including a formal letter, the questionnaire, and two annexes with a fact sheet and a list of ETRS89 realizations in the European countries.

Action Item 16 on Agenda Item 13c for all: provide MP with information useful for the EUREF talk to be given at the ICG-11 meeting (until Nov, 4).

Action Item 17 on Agenda Item 15 for RP and WS: set up a doodle for possible dates for the next TWG meeting.

PARTICIPANTS

TWG members:
Z. Altamimi (ZA)
E. Brockmann (EB)
C. Bruyninx (CB)

A. Caporali (AC)
R. Dach (RD)
J. Dousa (JD, excused)
R. Fernandes (RF)
H. Habrich (HH, excused)
J. Ihde (JI, excused)
A. Kenyeres (AK)
M. Lidberg (ML)
T. Liwosz (TL)
R. Pacione (RP)
M. Poutanen (MP)
W. Söhne (WS)
G. Stangl (GS)
J. Torres (JT, excused)

Guests:
A. Araskiewicz (AA)
J. Kaplon (JP)
P. Mitterschiffthaler (PM)
C. Voelksen (CV)